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GEOMATRIX

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April 26, 2001
Project 4132.000.0

Mr. William F. Lowe
Project Coordinator
RCAP
Air, RCRA, and Toxics Division
USEPA, Region VII
901 North 5th Street
Kansas City, KS 66101

Subject: Vopak USA Inc., Buckingham Place, Omaha, Nebraska
EPA ID# NED986375327

Dear Mr. Lowe:

This letter presents proposed revisions to the Draft Corrective Measures Study Report (CMS) for the referenced Facility. The proposed revisions incorporate the comments made by the U.S. Environmental Protection Agency (USEPA) in correspondence to Van Waters & Rogers Inc. (now Vopak USA Inc. [Vopak]) dated March 15, 2001. With the approval of the USEPA, the CMS will be revised and submitted as final to the USEPA.

1. Pages 4 and 5, Section 3.2.1
The CMS should explain the sources of hydraulic conductivity estimates for the various strata.

The CMS will be revised to reference the sources of the hydraulic conductivity data. These sources include the RFI Report and Appendix B (slug test data) and F (laboratory hydraulic conductivity test data) of the CMS Report.

2. Page 4 and 5, Section 3.2.1
The CMS should give the depth to groundwater, in feet below ground, and seasonal fluctuations in the water table.

The CMS will be revised to give the depth to groundwater in feet below ground (it is approximately 60 feet below ground on average) and seasonal fluctuation in the water table (4 feet for wells in the I Sand Unit, 6 feet for MW4S).

3. Page 7, Section 3.2.3.1

a. In the first paragraph, provide an estimate of how many cubic yards of soil are impacted with pesticide contamination above clean up standards. Separate the estimate into how many yards are covered and not covered by concrete foundations.

This estimate will be provided. The total volume of soil impacted with pesticides at concentrations above the media cleanup standard is approximately 2,100 cubic yards. Of this total, approximately 700 cubic yards are covered by concrete foundations; approximately 1,400 cubic yards are not covered by concrete foundations. The area not covered by concrete foundations is nearly entirely covered with asphalt.

b. In the second paragraph, provide an estimate of how many cubic yards of soil are impacted with VOC contamination above clean up standards in the upper five feet of loess. Separate the estimate into how many yards are covered and not covered by concrete foundations.

This estimate will be provided. The volume of soil impacted with VOCs at concentrations above the interim screening criteria (ISC) in the uppermost 5 feet of loess is approximately 260 cubic yards. Of this total, approximately 100 cubic yards are covered by the concrete foundation near MW4S and MW4I and approximately 160 cubic yards are not covered by concrete foundations. The areas of impacted soil are illustrated on the attached figure (Attachment A), which is a proposed revised version of Figure 2 for the CMS.

ISCs were calculated for each of the constituents of concern during the RCRA Facility Investigation (RFI). For the VOCs that are of concern, the ISCs are as follows (in milligrams per kilogram [mg/kg]):

Tetrachloroethene	160.0
Trichloroethene	61.0
Chloroform	5.2
1,1-Dichloroethene	1.1

The ISCs listed above are from Attachment 2 of Appendix E to the USEPA-approved RFI Report and were calculated during the RFI using the methodology provided in the USEPA Region 9 Preliminary Remediation Goals (PRGs). The calculation was based on an adult industrial worker scenario, and is protective of a construction worker scenario as documented in the RFI Report.

As observed in the RFI Report and the draft CMS Report, representative concentrations for VOCs are below the media cleanup standard with regard to ingestion and inhalation pathways.

That is, the residual average concentration of a given VOC or combination of VOCs in soil do not pose an unacceptable level of risk to the health of construction workers or industrial workers. This assumes a worker will not remain in a "hot spot" of impacted soil but will move about the Facility. The reduced duration of exposure results in a reduced health risk. However, additional risk reduction would be achieved by addressing the two "hot spots" illustrated on Figure 2. Therefore, in the evaluation of alternatives (in Section 5.3.1 of the CMS), weight will be added to those alternatives that address these two areas.

4. Page 10, Section 3.4.2
VWR should explain the basis for eliminating pesticides from the list of COC's in groundwater.

The report will be revised to include the basis for eliminating pesticides from the list of COCs in groundwater. Pesticides are not groundwater COCs at the Facility based on the following:

- Pesticides were not detected in groundwater except at extremely low concentrations and these results were not reproducible in subsequent sampling and analysis.

- The pesticides in soil are limited to the uppermost 5 feet below ground surface in most cases. The highest soil concentrations are typically limited to the uppermost 2 feet below ground surface.

- The pesticides would need to be leached and transported downward 55 feet from the impacted zone to the water table to affect groundwater in the S Stratified Unit. Because the pesticide in soil impacts remain relatively shallow after decades of potential leaching, groundwater does not appear to be at risk.

5. Section 4.1
VWR should evaluate the treatment options for preventing these areas (of VOCs in some of the shallow soils [<20 feet deep]) from acting as ongoing sources of contamination to groundwater as well as ensuring that future construction workers are protected from exposures. For deeper soils, VWR should also evaluate dual phase (water and soil-gas combination) extraction as a potential remedy that applies to VOC contamination in both media.

Section 4.1 will be revised to include an evaluation of how the each alternative, where applicable, could address VOCs in soil. This will include a description of the limitations arising from the physical characteristics of the soil at the Facility and the distribution of COCs. Some alternatives, such as dual phase extraction, were screened out in Table 4, and text summarizing the rationale for screening out alternatives will be added to paragraph 1 of section 4.0.

6. Page 15, Section 4.2.2, paragraph 3
Additional information to more clearly demonstrate the decrease in contaminant concentration in monitoring wells MW4S and MW7I needs to be provided.

The discussion of the Mann-Kendall test and its use in evaluating concentration trends over time will be expanded. In addition, the text will include a reference to Appendix C, where a very detailed description of the Mann-Kendall test and a tabulation of the test results are presented. (A brief summary of the Mann-Kendall test is attached to this letter [Attachment B]). The use of the Mann-Kendall test as a tool to objectively evaluate temporal trends in groundwater geochemistry is supported in the current literature regarding monitored natural attenuation (Wiedemeier et al., 1999; National Research Council, 2000; Wisconsin Department of Natural Resources, 1999). Groundwater chemical data from the latest monitoring event, conducted in January 2001, will be added to the report. These data have been submitted to the USEPA as part of the 1st Quarter 2001 progress report.

7. Page 29, paragraph 2
This paragraph in reference to future groundwater monitoring mentions "…one well" located near Spring Lake Park. This reference to "one well" must be removed from the report.

The specific mention of "at least one monitoring well located near Spring Lake Park" was made to indicate the importance of monitoring in this specific location. Because the configuration of the monitoring network is yet to be determined, this sentence is overly specific and will be deleted.

8. Appendix A, Section 3.0
The CMS Report should be revised to address possible addition of this chemical [toxaphene] to the COC list.

Toxaphene was referred to as a COC in the draft CMS Report in that an ISC was presented for this chemical. The addition of this chemical as a COC will be stated more plainly by adding toxaphene to the tabulated list of COCs (Table 1).

9. Appendix C, Figure 1
The hydro graphs for most monitoring wells are similar, but those for monitoring wells MW4S and MW9S are quite different. However, there is no explanation for this difference, either on the figure or in the accompanying text. This information should be included in the report.

An evaluation of the hydrograph as it relates to the S Stratified Unit will be added to Appendix C, Section 2.0. The hydrographs for the S Stratified Unit wells are distinctly different from those for the I Sand Unit wells. These data support the interpretation of the hydrostratigraphy in the following ways: the S Stratified Unit and the I Sand Unit are separate water-bearing units, and the S Stratified Unit is characterized by heterogeneity.

10. Appendices B, C and D
References for citations in these appendices are not provided.

These references will be provided in the revised report.

11. Appendix C, Section 3.2.1, Page 4, Paragraph 1
The report needs to be expanded to discuss trend analysis in groundwater samples in more detail, to further support the assertion that CVOC concentrations are decreasing.

The last sentence of paragraph 1 will be deleted because the conclusion relies on a subjective reading of the charted data. The trend analysis will be discussed in the manner described for comment 6, which is to say using statistical tests, and this discussion is developed in paragraph 2 of Section 3.2.1.

12. Appendix C, Section 3.2.1, Page 5, Paragraph 3
VWR must evaluate all available data as part of its trend analysis.

VW&R has and will continue to evaluate all available data as part of the trend analysis. The text of Appendix C will be revised by moving the explanation of the methodology and results of the trend analysis from Attachment B (where it was contained in the draft) to the main body of Appendix C. The text of paragraph 3 will be changed to clarify the fact that all data were used in the analysis. New data collected since submittal of the draft CMS Report will be included in the trend analysis. These data were reported to the USEPA in the 1st Quarter 2001 progress report and support the conclusions drawn in the CMS.

13. VW&R should revise the CMS to evaluate in-situ chemical oxidation of near surface soils and to evaluate combinations of remedial technologies for contaminated soil.

After screening 35 technologies and process options (Table 4 of the CMS), both as stand-alone alternatives and in combinations, alternatives were identified for detailed evaluation for addressing media cleanup standards for soil and groundwater. Included in this screening evaluation was the use of in situ chemical oxidation in near-surface soil. The finding was that the injection of treatment chemicals would not be effective, regardless of depth. While some oxidation would occur, the clayey conditions of the soil would prevent effective distribution of treatment chemicals throughout the impacted soil matrix. That this permeability limitation applies to near-surface soil was confirmed with additional hydrologic tests, as reported in Appendix A of the CMS. Mechanical mixing of near surface soil to achieve effective distribution of treatment chemicals would be essentially the same as the ex situ approach that was found to be feasible but was not selected in favor of an engineered cover. Revisions to Section 4.0 described for comment 5 will help clarify these issues.

In regard to the use of combinations of remedial technologies, the selection process was based on addressing the media cleanup standards articulated in the CMS. If one technology alone were not capable of addressing these standards, then the use of alternatives in combination or in series would have been evaluated. Because the selected approach addresses the media cleanup standards, combinations of alternatives are unnecessary and redundant. Text to this effect will be added to Section 4.0.

SPECIFIC COMMENTS ON Appendix F, Attachment A

1. VW&R should revise Appendix F, Attachment A to include a spreadsheet that shows mass balance calculations that were used to determine the treatment efficiencies.

Appendix F will be revised to include an expanded tabulation of the mass balances and the treatment efficiencies for the batch tests. The table will include the formulae used to calculate the treatment efficiencies.

2. VW&R should revise Appendix F, Attachment A to indicate whether the soil analytical data were provided on a wet or dry basis.

Appendix F will be revised to indicate that the data presented in Attachment A are reported on a wet weight basis. The moisture content will be presented to show that the moisture content is similar for all samples. Because the moisture contents are similar, the mass balance results are also similar whether or not moisture content is considered. Consequently, the conclusions based on the findings of the batch tests would be unchanged by incorporating the effect of moisture content.

3. VW&R should revise Appendix F, Attachment A to indicate whether the liquid-phase portion of the samples was processed prior to analysis.

Appendix F will be revised to include the following clarifying information. The separation of soil and liquid was accomplished by centrifugation, as noted in the "Procedures" section of Attachment A. A few drops of saturated sodium chloride (NaCl) solution were added to help settle the clay fraction. The liquid samples were not filtered. The handling of control (i.e., untreated) and treated samples was the same. Because the calculated treatment efficiencies are based on a comparison to the control samples, the handling of the liquid sample does not affect the treatment efficiency results.

4. VW&R should revise Appendix F, Attachment A to explain the rationale for determining the treatment efficiencies based on the quantity of COCs in the control samples after processing and discuss whether treatment processing may have changed the COC concentrations.

Appendix F will be revised to include the following information. The treatment efficiency, represented by the "percent removed" for each oxidation method, was calculated by comparing the amount of each COC remaining after treatment to the amount in the associated control sample. The control had been subjected to the same processing and handling as the treated samples, except that no oxidizing agent had been added. The controls (rather than the mass of COC originally in the soil) were therefore used as the basis of the treatment efficiency calculations. By using the control as the basis, losses can be ascribed to treatment rather than handling and processing.

5. VW&R should revise Appendix F, Attachment A to evaluate whether the COCs were completely oxidized during the bench scale study and include the chromatographs to support that evaluation.

Appendix F will be revised to include the following information. Detailed product studies were beyond the intended scope of the bench test. Product studies would have been conducted had this alternative been selected.

Once approved by the USEPA, the modifications to the draft CMS Report recommended in this letter will be implemented. If you have any questions, please call Eric Tollefsrud at Geomatrix at 952-935-1010, or Jim Hooper at VW&R at 630-761-0486.

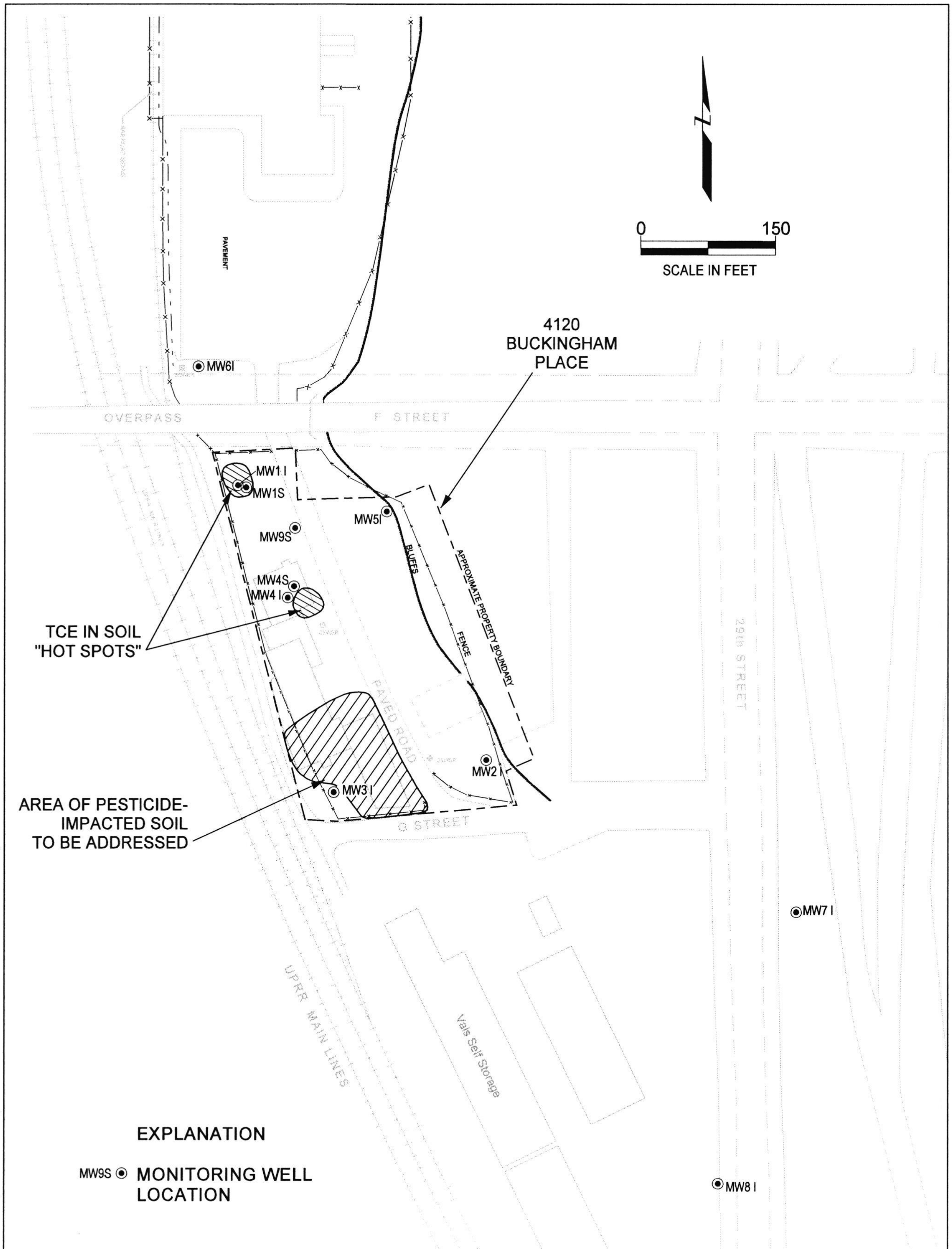
Sincerely yours,
GEOMATRIX CONSULTANTS, INC.

E. Tollefsrud

Eric Tollefsrud, R.G.
Senior Hydrogeologist

cc: Mr. James Hooper, Van Waters & Rogers Inc.

Attachments
- A Revised Figure 2
- B Brief summary of the Mann-Kendall Test



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Project No.	4132
Figure	2

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A Brief Summary of the Mann-Kendall Test for Evaluating Trends in Groundwater Contaminant Concentrations

Decisions regarding corrective action for groundwater are in large part based on an evaluation of the trends in groundwater contaminant concentrations. Such decisions run the spectrum from deciding to terminate monitoring (where trends are clearly decreasing) to deciding to invoke a contingency plan (where trends are clearly increasing). A tool or method is needed to evaluate the trend, to demonstrate whether groundwater contaminant concentrations in a monitoring well are increasing, stable (i.e., there is no trend), or decreasing. The method ought to be reliable and quantifiable, so that "triggers" for decisions can be agreed upon confidently and proactively.

In general practice, trends are evaluated in the following ways: 1) a subjective analysis of a chart of concentration as a function of time (i.e., reading the chart), or 2) an objective statistical test. When there is a strong, obvious trend in the data, with no fluctuations, a subjective reading of a chart of concentrations as a function of time can be an effective method for identifying trends in the data. Often it the case that trends are subtle or are developing slowly over time. Some data sets contain a great deal of scatter or fluctuation. In these cases, subjective analysis may be unreliable as a basis for decision-making.

Statistical methods are available to provide a reliable, quantifiable test of the trend, even where trends are complex. The level of confidence in the result can be specified. For example, a test can be used to conclude the concentration is increasing, or stable, or decreasing at a level of confidence of, say 80 percent. A test (called a coefficient of variation) can be used to ensure that a finding of "no trend in the data" is not merely the result of a great deal of scatter in the data.

A commonly used test for trend analysis is the Mann-Kendall test. This test can be used with a minimum of four consecutive rounds of sampling results. The Mann-Kendall test is relatively straightforward, and is a method for numerically scoring and ranking the highs and lows that the eye sees when reading a chart of concentration data. The test is conducted as follows, using the example where there are just four sampling events to simplify the explanation:

1. Assemble the concentration data in chronological order.

2. Assign to non-detections a single value that is less than the detection limit, so that the result is not affected merely by changes in the detection limit from one round to another.

3. Compare the concentration for each round sequentially, comparing the results from sampling event 1 to sampling event 2, then 3, and then 4. For each comparison, assign a value, either +1, 0 or –1, indicating whether the later round was higher, the same, or lower than the earlier round.

4. After comparing the concentration from round 1 to the other three rounds, and determining the value to assign (+1, 0 or –1) to each comparison, total all the values.

5. Repeat the process for sampling rounds 2 and 3.

6. Sum the totals that were calculated in step 4. This is the "Mann-Kendall Statistic" or "S" value.

7. Look-up tables have been developed in statistics textbooks (for example, Statisical Methods for Environmental Pollution Monitoring by Gilbert, 1987) for evaluating what the S value means in regard to the trend. In the example used above, where there are four sampling events, the look-up table shows that if S is –4 or less, one can have an 80 percent level of confidence that there is a decreasing trend. In the same example, if S is greater than or equal to 4, there is an increasing trend.

8. If the test indicates neither an increasing nor decreasing trend, the plume may be stable or there may simply be too much scatter in the data to make a determination. The "coefficient of variation" (CV) is used to assess the scatter in the data. CV is the standard deviation divided by the arithmetic mean and should be less than or equal to 1 to conclude that the plume is stable. Otherwise, no conclusion can be made using the given data set and additional data need to be collected.

The summary given above is adapted from a description of the "Statistical Tests for Determining the Effectiveness of Natural Attenuation" prepared by the Wisconsin Department of Natural Resources. The State of Wisconsin was among the first states to provide for monitored natural attenuation as a potential remedial alternative in their state statutes.